

**WHAT IS CLAIMED IS:**

1. A system for monitoring a semiconductor production apparatus, comprising:

data acquisition means for acquiring from the semiconductor production apparatus a plurality of pieces of process data including values of a plurality of process parameters which are obtained while the semiconductor production apparatus is in operation; and

model creation means for creating a multivariate analysis model using at least a portion of the plurality of pieces of process data.

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2. The monitoring system of claim 1, wherein:

the semiconductor production apparatus includes a plurality of control devices and a controller computer connected to the plurality of control devices; and

15 the data acquisition means is connected to the controller computer and acquires from the controller computer the plurality of pieces of process data in the form of digital data.

3. The monitoring system of claim 2, wherein the data acquisition means acquires the plurality of pieces of process data using SECS, GEM, or HSMS.

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4. The monitoring system of claim 1, wherein:

the semiconductor production apparatus includes a plurality of control devices; and

25 the data acquisition means is connected to the plurality of control devices and acquires from the plurality of control devices the plurality of pieces of process data in

the form of analog data.

5. The monitoring system of claim 1, further comprising data evaluation means for evaluating a plurality of pieces of new process data including values of the plurality of process parameters, which are newly acquired by the data acquisition means based on the multivariate analysis model created by the model creation means, to determine whether the 5 operation status of the semiconductor production apparatus is normal or abnormal.

6. The monitoring system of claim 5, further comprising:

10                   lot information acquisition means for acquiring from the semiconductor production apparatus its process lot information; and

                      lot information addition means for adding the process lot information acquired by the lot information acquisition means to the plurality of pieces of new process data.

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7. The monitoring system of claim 5, wherein:

                      the semiconductor production apparatus is connected to a host computer which retains process lot information of the semiconductor production apparatus; and

                      the monitoring system further includes

20                   lot information acquisition means for acquiring the process lot information from the host computer, and

                      lot information addition means for adding the process lot information acquired by the lot information acquisition means to the plurality of pieces of new process data.

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8. The monitoring system of claim 1, wherein the model creation means performs at least a principal component analysis.

9. A system for monitoring a semiconductor production apparatus, comprising:

5                   data acquisition means for acquiring from the semiconductor production apparatus a plurality of pieces of process data including values of a plurality of process parameters which correspond to a plurality of steps of a process recipe, the values being obtained while the semiconductor production apparatus is in operation;

10                  data dividing means for dividing the plurality of pieces of process data for the respective process parameters and for the respective steps; and  
                      model creation means for creating a multivariate analysis model using data obtained by dividing the plurality of pieces of process data.

10. The monitoring system of claim 9, wherein:

15                  the semiconductor production apparatus includes a plurality of control devices and a controller computer connected to the plurality of control devices; and  
                      the data acquisition means is connected to the controller computer and acquires from the controller computer the plurality of pieces of process data in the form of digital data.

20                  11. The monitoring system of claim 10, wherein the data acquisition means acquires the plurality of pieces of process data using SECS, GEM, or HSMS.

12. The monitoring system of claim 9, wherein:

25                  the semiconductor production apparatus includes a plurality of control

devices; and

the data acquisition means is connected to the plurality of control devices and acquires from the plurality of control devices the plurality of pieces of process data in the form of analog data.

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13. The monitoring system of claim 9, further comprising data evaluation means for evaluating a plurality of pieces of new process data including values of the plurality of process parameters, which are newly acquired by the data acquisition means, based on the multivariate analysis model created by the model creation means, to determine whether the  
10 operation status of the semiconductor production apparatus is normal or abnormal.

14. The monitoring system of claim 13, further comprising:

lot information acquisition means for acquiring from the semiconductor production apparatus its process lot information; and

15                   lot information addition means for adding the process lot information acquired by the lot information acquisition means to the plurality of pieces of new process data.

15. The monitoring system of claim 13, wherein:

20                   the semiconductor production apparatus is connected to a host computer which retains process lot information of the semiconductor production apparatus; and

the monitoring system further includes

lot information acquisition means for acquiring the process lot information from the host computer, and

25                   lot information addition means for adding the process lot

information acquired by the lot information acquisition means to the plurality of pieces of new process data.

16. The monitoring system of claim 9, wherein the model creation means performs at least  
5 a principal component analysis.

17. A system for monitoring a plurality of semiconductor production apparatuses,  
comprising:

a plurality of data acquisition means, each data acquisition means acquiring  
10 from a corresponding one of the plurality of semiconductor production apparatuses a plurality of pieces of process data including values of a plurality of process parameters which are obtained while the plurality of semiconductor production apparatuses are in operation;

a plurality of model creation means, each model creation means creating a  
15 multivariate analysis model using at least a portion of the plurality of pieces of process data which are obtained by the each of the plurality of data acquisition means;

a plurality of data evaluation means, each data evaluation means evaluating  
a plurality of pieces of new process data including values of the plurality of process parameters which are newly acquired by the each of the plurality of data acquisition means  
20 based on the multivariate analysis model created by the each of the plurality of model creation means, thereby determining whether the operation status of the corresponding one of the plurality of semiconductor production apparatuses is normal or abnormal; and

central monitoring means for accessing the respective one of the plurality of data evaluation means at a predetermined time interval to acquire results of the  
25 determination by the respective one of the plurality of data evaluation means as to whether

the operation statuses of the plurality of semiconductor production apparatuses are normal or abnormal.

18. A system for monitoring a plurality of semiconductor production apparatuses,  
5 comprising:

a plurality of data acquisition means, each data acquisition means acquiring from a corresponding one of the plurality of semiconductor production apparatuses a plurality of pieces of process data including values of a plurality of process parameters which correspond to a plurality of steps of a process recipe, the values being obtained  
10 while the plurality of semiconductor production apparatuses are in operation;

a plurality of data dividing means, each data dividing means dividing the plurality of pieces of process data, which are acquired by the each of the plurality of data acquisition means, for the respective process parameters and for the respective steps;

15 a plurality of model creation means, each model creation means creating a multivariate analysis model using data obtained by dividing the plurality of pieces of process data by the each of the plurality of data dividing means;

20 a plurality of data evaluation means, each data evaluation means evaluating a plurality of pieces of new process data including values of the plurality of process parameters which are newly acquired by the each of the plurality of data acquisition means based on the multivariate analysis model created by the each of the plurality of model creation means, thereby determining whether the operation status of the corresponding one  
25 of the plurality of semiconductor production apparatuses is normal or abnormal; and

central monitoring means for accessing the respective one of the plurality of data evaluation means at a predetermined time interval to acquire results of the determination by the respective one of the plurality of data evaluation means as to whether

the operation statuses of the plurality of semiconductor production apparatuses are normal or abnormal.

19. A method for monitoring a semiconductor production apparatus, comprising:

5           a data acquisition step of acquiring from the semiconductor production apparatus a plurality of pieces of process data including values of a plurality of process parameters which are obtained while the semiconductor production apparatus is in operation; and

              a model creation step of creating a multivariate analysis model using at least

10    a portion of the plurality of pieces of process data.

20. The monitoring method of claim 19, wherein:

              the semiconductor production apparatus includes a plurality of control devices and a controller computer connected to the plurality of control devices; and

15           the data acquisition step includes a step of acquiring from the controller computer the plurality of pieces of process data in the form of digital data.

21. The monitoring method of claim 20, wherein the data acquisition step includes a step of acquiring the plurality of pieces of process data using SECS, GEM, or HSMS.

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22. The monitoring method of claim 19, wherein:

              the semiconductor production apparatus includes a plurality of control devices; and

25           the data acquisition step includes a step of acquiring from the plurality of control devices the plurality of pieces of process data in the form of analog data.

23. The monitoring method of claim 19, further comprising a data evaluation step of evaluating a plurality of pieces of new process data including values of the plurality of process parameters, which are newly acquired at the data acquisition step, based on the  
5 multivariate analysis model created at the model creation step, to determine whether the operation status of the semiconductor production apparatus is normal or abnormal.

24. The monitoring method of claim 23, further comprising:

a lot information acquisition step of acquiring from the semiconductor  
10 production apparatus its process lot information; and

a lot information addition step of adding the process lot information acquired at the lot information acquisition step to the plurality of pieces of new process data.

15 25. The monitoring method of claim 23, wherein:

the semiconductor production apparatus is connected to a host computer which retains process lot information of the semiconductor production apparatus; and

the monitoring method further includes

a lot information acquisition step of acquiring the process lot  
20 information from the host computer, and

a lot information addition step of adding the process lot information acquired at the lot information acquisition step to the plurality of pieces of new process data.

26. The monitoring method of claim 19, wherein the model creation step includes a step of performing at least a principal component analysis.

27. A method for monitoring a semiconductor production apparatus, comprising:

5           a data acquisition step of acquiring from the semiconductor production apparatus a plurality of pieces of process data including values of a plurality of process parameters which correspond to a plurality of steps of a process recipe, the values being obtained while the semiconductor production apparatus is in operation;

10          a data dividing step of dividing the plurality of pieces of process data for the respective process parameters and for the respective steps; and

              a model creation step of creating a multivariate analysis model using data obtained by dividing the plurality of pieces of process data.

28. The monitoring method of claim 27, wherein:

15          the semiconductor production apparatus includes a plurality of control devices and a controller computer connected to the plurality of control devices; and

              the data acquisition step includes a step of acquiring from the controller computer the plurality of pieces of process data in the form of digital data.

20          29. The monitoring method of claim 28, wherein the data acquisition step includes a step of acquiring the plurality of pieces of process data using SECS, GEM, or HSMS.

30. The monitoring method of claim 27, wherein:

              the semiconductor production apparatus includes a plurality of control devices; and

the data acquisition step includes a step of acquiring from the plurality of control devices the plurality of pieces of process data in the form of analog data.

31. The monitoring method of claim 27, further comprising a data evaluation step of  
5 evaluating a plurality of pieces of new process data including values of the plurality of process parameters, which are newly acquired at the data acquisition step, based on the multivariate analysis model created at the model creation step, to determine whether the operation status of the semiconductor production apparatus is normal or abnormal.
- 10 32. The monitoring method of claim 31, further comprising:
  - a lot information acquisition step of acquiring from the semiconductor production apparatus its process lot information; and
  - a lot information addition step of adding the process lot information acquired at the lot information acquisition step to the plurality of pieces of new process  
15 data.

33. The monitoring method of claim 31, wherein:
  - the semiconductor production apparatus is connected to a host computer which retains process lot information of the semiconductor production apparatus; and
  - 20 the monitoring method further includes
    - a lot information acquisition step of acquiring the process lot information from the host computer, and
    - a lot information addition step of adding the process lot information acquired at the lot information acquisition step to the plurality of pieces of new process  
25 data.

34. The monitoring method of claim 27, wherein the model creation step includes a step of performing at least a principal component analysis.